Item 2

A bakery has UGX. 700,000 to produce two types of cakes, Cake A and Cake B. Each cake type requires specific ingredients, and the goal is to minimize the total cost while meeting the demand for both cakes. The production involves two main ingredients: Ingredient X and Ingredient Y. The cost and availability of these ingredients are limited, and each type of cake requires different amounts of these ingredients.

Given Data:

- Cost per gram of Ingredient X: UGX.3000
- Cost per gram of Ingredient Y: UGX.5000
- Ingredient requirements per gram of Cake A:
  - Ingredient X: 4 grams
  - Ingredient Y: 2 grams
- Ingredient requirements per gram of Cake B:
  - Ingredient X: 3 grams
  - Ingredient Y: 5 grams
- Availability of ingredients:
  - Ingredient X: 80 grams
  - Ingredient Y: 90 grams
- Demand:
  - Cake A: At least 7 grams
  - Cake B: At least 10 grams

Task:

(a) Write the constraints for ingredient limitations and demand requirements.

(b) Show the feasible region of the constraints on the Cartesian plane.

(c) Determine how much the bakery can save on production costs based on the optimal solution.